

# The Unique Caribbean Environment

Sharing responsibility with other federal and local agencies for the protection of the Caribbean islands of Puerto Rico and the U.S. Virgin Islands provides Region 2 with a set of unique opportunities and challenges.

## Protecting Island Ecosystems

Opportunities come from the ability to protect the natural beauty of these highly productive ecosystems not commonly found in the United States. These ecosystems include tropical rainforests, mangrove forests, and coral reefs—some of the most biologically diverse ecological communities in the world. These valuable resources face threats not only from natural disasters such as hurricanes, but also from human impacts including improperly treated sewage, extensive land conversion and deforestation, over-fishing, and tourism-related impacts.

While protecting fragile ecosystems is a national priority, it is especially important in areas such as the Caribbean islands. Tourists flock to the islands to enjoy the beautiful beaches and warm temperatures, and to explore the coral reefs and other ecosystems unique to islands. Maintaining these resources provides both ecological and economic benefits.

Protecting the islands' ecosystems presents special challenges since each ecosystem component—such as a reef community—is part of a complex system. For example, in the Virgin Islands, reefs near the Salt River Bay in St. Croix depend on mangroves and sea grass colonies along the coast for protection against runoff. Protection of the reef requires not only guarding against damage from boat anchors, coral collecting and over-fishing, but also maintaining the health of plant communities along the coast. Similarly, Puerto Rico's bioluminescent bays depend on mangrove forests to provide nutrients necessary for supporting the high populations of bioluminescent microorganisms.

Unfortunately, continued land development and pollution threaten mangroves throughout the islands. In Puerto Rico, for example, only one-quarter of the original mangroves remain. Other threats to island ecosystems include untreated, or improperly treated, wastewater, as well as agricultural and urban runoff. In addition, natural events such as hurricanes can affect the biological integrity of the islands' ecosystems.

Other factors impacting the reefs include high nutrient impacts from improperly treated sewage, and agricultural and urban runoff. Not all problems facing the reefs are human-made. Natural factors such as hurricanes can also break down the reefs and impact the biological structure of the systems. However, in the absence of the incremental pressures posed by human activities, the coral reefs can respond to naturally-occurring impacts much more quickly with fewer long-term effects.

## Special Challenges

In addition to the presence of these precious ecological resources, both Puerto Rico and the Virgin Islands face special challenges due to their relative isolation and small size. Among these are problems associated with the disposal of solid waste and quantity of potable water available on the islands.

### Solid Waste

Proper waste management is a very large challenge in the Caribbean. There is less land suitable for siting landfills and less soil available for required daily landfill cover than in the continental U.S. In addition, much of Puerto Rico and the Virgin Islands has underground limestone formations with sinks, underground streams, and caverns—terrain unsuitable for siting landfills. In the Virgin Islands, St. Thomas and St. Croix are small in size and contain airports, making the placement of landfills difficult due to prohibitions against siting landfills near airports because they attract birds. In addition, half of St. John is a national park. Proper waste management requires that landfills be covered daily by a layer of soil, which can be expensive and difficult to acquire on an island. In the continental U.S., garbage can be transported out-of-state for disposal, but the export of waste is generally not an affordable option for the Caribbean islands.

There are also numerous obstacles to implementing recycling programs, including geographic difficulties and a small market for recyclables. Accordingly, recycling has been slower to start in Puerto Rico and the Virgin Islands than elsewhere in the country. However, there are indications that recycling programs are moving forward. Recycling rates have risen to 15 percent in Puerto Rico with the use of 73 drop-off sites. A pilot curbside collection program is also underway in San Juan. EPA-supported efforts to

## Puerto Rico

<b>Capital:</b>	San Juan
<b>Population:</b>	3,819,023 (1996)
<b>Population distribution:</b>	71.2% urban, 28.8% rural (1990)
<b>Population density:</b>	1,083.5 people per square mile (1997)
<b>Miles of ocean coast:</b>	550
<b>Land area:</b>	3459 square miles (includes islets of Vieques, Culebra, and Mona)
<b>Land use:</b>	13% cropland, 41% meadows/pastures, 20% forest & woodland, 26% other

promote recycling in the Caribbean include developing a model backyard composting project in a St. Croix neighborhood and hiring an economic development advocate to encourage the development of a market for recyclables in the Virgin Islands. Another positive development is the formation in 1995 of the Wider Caribbean Waste Reduction and Recycling Alliance, known as ReCarib, which works to improve recycling and other waste management practices in the wider Caribbean region.

### Drinking Water

Providing drinking water to residents of Puerto Rico and the Virgin Islands represents one of the most significant environmental challenges facing the Caribbean islands. The islands face recurrent problems with both water quantity and quality. Water shortages in areas served by surface water supplies occur frequently due to reduced reservoir volume resulting from reservoir sedimentation and dry weather conditions. During shortages, water supply lines can dry completely, resulting in water quality problems when water supply resumes. To address water shortages in San Juan, Puerto Rico's most populated area, the Commonwealth is constructing a "Superaqueduct" to ensure a steady supply of water from reservoirs located in the mountains.

Of Puerto Rico's almost four million residents, 97 percent receive household water from the Puerto Rico Aqueduct and Sewer Authority (PRASA) water systems.

The remaining three percent of the population, located in predominantly rural areas, receive water from one of approximately 250 non-PRASA systems. Most of these 250 systems do not comply with drinking water standards. To ensure that those served by non-PRASA water systems receive clean, safe drinking water, the Partnership for Pure Water (PPW) was established in 1992 with the goal of improving water quality in rural Puerto Rico. PPW is a public-private initiative providing technical and financial assistance as well as health education to communities dependent on non-PRASA systems. Some of the results of PPW's efforts include the rehabilitation of 77 drinking water systems, the installation of chlorinators, the repair of pipes and storage tanks, the installation of disinfection systems, and the delivery of 113 community lectures on health risks from unclear water. These actions will help to provide safe drinking water for approximately 50,000 residents of Puerto Rico.

In the Virgin Islands, the lack of sufficient surface water has led to the use of a variety of techniques—ranging from capturing rainwater to saltwater desalination—to meet the drinking water demand of the Islands' increasing year-round and tourist populations. In addition to rainwater and desalinated water, residents of St. Croix receive drinking water from ground water wells. The ground water network was expanded in 1988, partly in response to Hurricane Hugo, and again in 1992. Unfortunately, the Virgin Islands' ground water is typically of poor quality, due to high salt and mineral content, and often requires additional treatment. Because of the problems with

## U.S. Virgin Islands

<b>Capital:</b>	Charlotte Amalie, St. Thomas
<b>Population:</b>	97,120 (1996)
<b>Population distribution:</b>	St. Croix: 50,139 St. John: 3,504 St. Thomas: 48,166
<b>Population density:</b>	724.8 people per square mile
<b>Miles of ocean coast:</b>	173
<b>Land area:</b>	St. Croix: 84 square miles St. John: 20 square miles St. Thomas: 32 square miles
	(land area totals do not include 53 other islands and cays)

## Puerto Rico's National Treasure: The Coquí



José Colón

rainwater catchment and poor ground water quality, the Islands are increasingly relying on desalinated ocean water for their drinking water supply. Desalinated saltwater now accounts for 85 percent of potable water in the Virgin Islands.

## Hurricanes

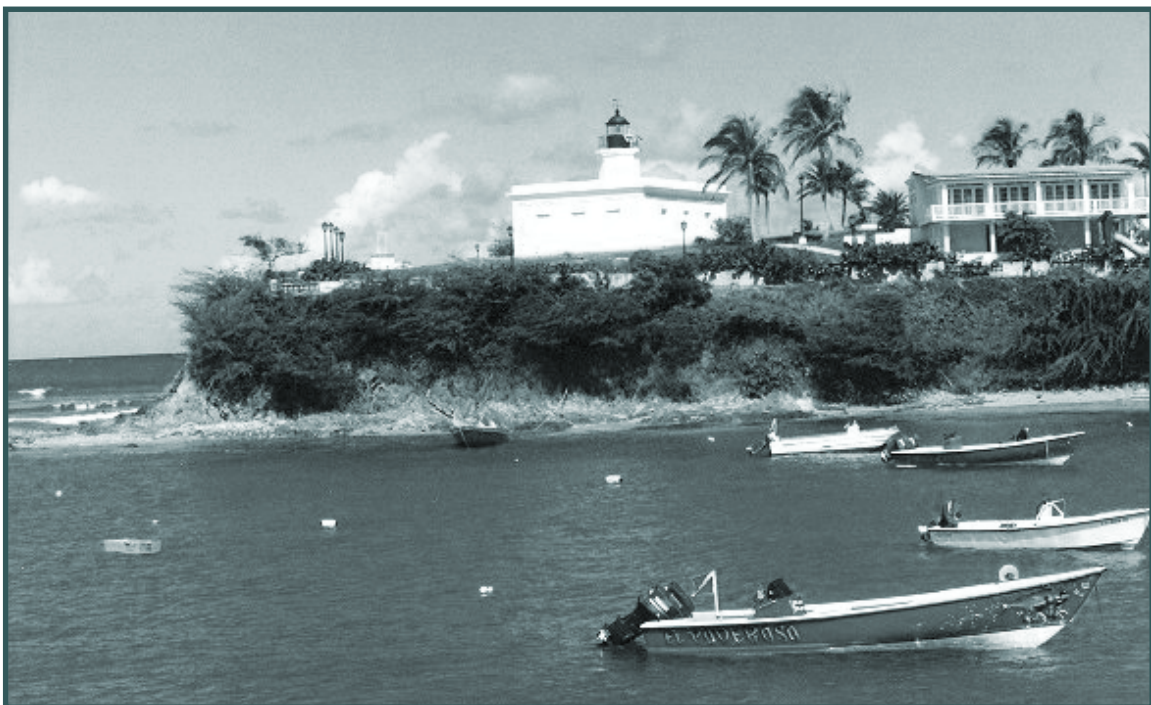
In addition to impacts on the integrity of the coral reef and mangrove systems, hurricanes pose significant human health risks to the residents of these island communities. Most hurricanes occur between the months of June and September. Although hurricanes can affect mainland areas as well, the relative isolation and small size of the islands makes recovery more difficult. Among the problems faced in the aftermath of a hurricane are the lack of potable drinking water due to bacterial contamination and inoperable sewage treatment plants leading to raw sewage discharges to coastal waters. Moreover, debris must be collected and disposed of quickly, which consumes large amounts of badly-needed landfill capacity.

## The EPA Presence

Through its Caribbean Environmental Protection Division (CEPD), Region 2 maintains an active and significant presence in both Puerto Rico and the Virgin Islands. From its main office in San Juan, Puerto Rico, the CEPD works closely with the Commonwealth and Territorial governments on solving environmental problems. It also provides a venue for residents to learn about EPA programs and to communicate their ideas and concerns. The office is currently undergoing a three-year phased expansion and is expected to nearly double in size until almost all of the EPA programs involving Puerto Rico and the Virgin Islands can be carried out directly in the Caribbean.

In addition to the San Juan location, EPA recently opened an office on St. Thomas in the Virgin Islands. Staffed by the Region 2 Virgin Islands Coordinator, this office will enable EPA to work more closely with local environmental agencies, and to offer compliance assistance, as well as enforcement oversight, to the regulated community.

Region 2 also has a long-established Regional Disaster Response Team that deploys staff to the Caribbean when hurricanes or other natural disasters occur. EPA works closely with other federal agencies and local governments to address chronic problems (ecosystem loss, improper landfill space) as well as the more catastrophic problems caused by hurricanes.



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